

L 23717-66

ACC NR: AP6007118

dition of bismuth or phosphorus sharply inhibit the reaction of  $\text{Cu}_3\text{Si}$  with methyl chloride even at high temperatures ( $390^\circ\text{C}$ ). Orig. art. has: 1 figure.

SUB CODE: 07/

SUBM DATE: 01Dec64/

ORIG REF: 003/

OTH REF: 000

Card 2/2 *lu*

L 23717-66 EWT(m)/EWP(j)/T RM

ACC NR: AP6007118

SOURCE CODE: UR/0079/66/036/002/0345/0347

AUTHOR: Lobusevich, N. P.; Golubtsov, S. A.; Layner, D. I.; Malysheva, L. A.; Trofimova, I. V. 41

ORG: none B

TITLE: On the problem of promoters and poisons in the direct synthesis of methylchlorosilanes

SOURCE: Zhurnal obshchey khimii, v. 36, no. 2, 1966, 345-347

TOPIC TAGS: silane, bismuth, phosphorus, antimony, copper alloy, silicon alloy, zinc, *chemical decomposition*

ABSTRACT: The kinetics of the decomposition of  $\text{Cu}_3\text{Si}$  were studied during its reaction with methyl chloride in the presence of promoters (arsenic, phosphorus mixed with antimony and zinc) and contact poisons (bismuth and phosphorus). Addition of the most active promoters lowers the temperature at which the  $\text{Cu}_3\text{Si}$  alloy begins to react with methyl chloride from  $330^\circ$  to  $270^\circ\text{C}$  in the case of arsenic and from  $330^\circ$  to  $290^\circ\text{C}$  in the case of the phosphorus-antimony mixture. The activation energy of the reaction between  $\text{Cu}_3\text{Si}$  and methyl chloride decreases by one-half when these promoters are introduced. The action of the zinc promoter increases the reaction rate, but the activation energy remains practically unchanged. Apparently, elemental zinc converts into zinc chloride which accelerates the reaction of dimethyldichlorosilane formation. Ad-

Card 1/2 2

VLADIMIRSKIY, V.V.; KOMAR, Ye.G.; MINTS, A.I.; GOD'DIN, L.L.; MOMOSZON, N.A.;  
RUBCHINSKIY, S.M.; TARASOV, Ye.K.; VASIL'YEV, A.A.; VODOP'YANOV, P.A.;  
KOSHKAREV, D.G.; KURYSHEV, V.S.; MALYSHEV, L.F.; STOLOV, A.M.;  
STREL'TSOV, N.S.; YAKOVLEV, B.M.

Designing a 7 Bev. synchrotron. Atom. energ. 12 no.6:472-474 Je  
'62. (MIRA 15:6)

(Synchrotron)

MALYSHEV, L.A., red.

[Bevel gear wheels (pairs) with circular teeth having a nominal inclination angle of  $35^\circ$ ] Kolesa (pary zubchatye konicheskie s krugovym zubom s nominal'nym uglom naklona zuba  $35^\circ$  (MN 4449-63 - MN 4478-63). Moskva, Izd-vo standartov, 1964. 123 p.  
(MIRA 17:8)

1. Russia (1923- U.S.S.R.) Komitet standartov, ser. 1 izmeritel'nykh priborov.

MALYSHEV, L.A., red.

[Dies for horizontal forging machines; design and construction] Shtampy dlia gorizonta'l'no-kovocnykh mashin; raschet, i konstruirovaniie (KTM 3<sup>o</sup>-61). Moskva, Izd-vo standartov, 1964. 115 p. (MIRA 17:2)

1. Russia (1958- U.S.S.R.) Komitet standartov, mer i izmeritel'nykh priborov.

MALYSHEV, L.A., red.

[Counterbores and countersinks] Zenkery i zenkovki  
(MN 700-60 - MN 716-60, MN 717-63, MN 718-63, MN 721-60 -  
MN 729-60). Moskva, Izd-vo standartov, 1964. 59 p.  
(MIRA 17:8)  
1. Russia (1923- U.S.S.R.) Komitet standartov, mer i iz-  
meritel'nykh priborov.

*MALYSHEV, KONSTANTIN NIKOLAYEVICH*  
NAGORNYY, Aleksey Afanas'yevich; MALYSHEV, Konstantin Nikolayevich;  
SHAYDEROV, B.M., redaktor; BEKMAN, Yu.K., vedushchiy redaktor;  
TROFIMOV, A.V., tekhnicheskiiy redaktor

[Organization of preventive repair of equipment used in the  
petroleum industry; a reference manual] Organizatsiia planovo-  
predupreditel'nogo remonta neftepromyslovogo oborudovaniia;  
spravochnik. Moskva, Gos.nauchno-tekhn. izd-vo neft. i gorno-  
toplivnoi lit-ry, 1957. 269 p. (MLRA 10:7)  
(Petroleum industry--Equipment and supplies)

IVANOV, Leonid Aleksandrovich, inzh.-gidrograf, kand. geogr. nauk;  
MALYSHEV, Konstantin Ivanovich, inzh.-ekonomist; YAROVA,  
L.V., red.; TIKHONOVA, Ye.A., tekhn. red.

[Economics and organization of hydrographic works] Ekonomika  
i organizatsiia gidrograficheskikh rabot. Moskva, Izd-vo  
"Morskoi transport," 1963. 199 p. (MIRA 16:10)  
(Russia, Northern--Hydrography)

'MALYSHEV, K.N'

CM

Apparatus for sampling oil wells. B. I. Vozdvizhenskiy and K. N. Malyshev. Russ. 51,024, May 31, 1967. Construction details.

ASME-52A METALLURGICAL LITERATURE CLASSIFICATION

L 7779-66

ACC NR: AP5028057

izucheniye prostranstvennoy korrelyatsii flyuktuatsiy amplitudy i fazy zvukovykh signalov, otrazhennykh ot volnuyushcheysya poverkhnosti morya. Akust. zh., 1964, 10, 4, 425-430.).  
Orig. art. has: 2 figures.

SUB CODE: GP, ES / SUBM DATE: 17 Feb 64 / ORIG REF: 004

Card

*mlr*  
2/2

L 7779-66 EWT(1)/EPF(n)=2/EED(b)=3/ETC(m) LIP(c) WW/GW  
ACC NR AP5028057

SOURCE CODE: UR/0046/65/011/004/0498/0500

AUTHOR: Gulin, E. P. ; Malyshev, K. I.

ORG: Institute of Acoustics, AN SSSR, Moscow (Akusticheskii institut AN SSSR)

TITLE: Space correlation of the fluctuation of the amplitude of a continuous tonal signal in the presence of reflections from a disturbed ocean surface

SOURCE: Akusticheskii zhurnal, v. 11, no. 4, 1965, 498-500

TOPIC TAGS: acoustic signal, reflected signal, ocean acoustics, acoustic measurement, acoustic wave propagation

ABSTRACT: This article presents the results of the measurement of the space correlation of the fluctuation of the amplitude of continuous acoustic signals at frequencies of 2.5, 4, 7, and 15 kcs. The distance between the source and the receiver in the various experiments was 500 to 700 m. The acoustic wave propagation path was in a region of a coastal wedge at a 20 to 30° angle to the ocean floor. The processing of the experimental data produced a series of coefficients of the space correlation of the disturbance and the fluctuation of the amplitude at different conditions of the ocean surface (1 to 3 units) and at different locations of the receiver with respect to the wave propagation path. The results obtained are compared with analogous data for pulse signals obtained by E. P. Gulin and K. I. Malyshev (Nekotoryye opyty po

MALYSHEV, K.I., kand. tekhn. nauk.

Determining yield, content and characteristics of peat. Torf. prom.  
35 no.7:10-13 '58. (MIRA 11:11)

1. Moskovskaya laboratoriya Vsesoyuznogo nauchno-issledovatel'skogo in-  
stituta torfyanoy promyshlennosti.  
(Peat) (Furaldehyde)

MALYSHEV, K. I.

2100. CHANGE IN CHEMICAL COMPOSITION AND PART PLAYED BY IRON IN THE  
SPONTANEOUS HEATING OF MILLED PEAT. Stralov, B. S. and Malyshev, K. I.  
(Proc. Inst. (Peat Ind., Moscow), 1955, (7), 17-20). A number of peats  
given to spontaneous heating were analyzed for water-soluble metals,  
carbonates and for iron extractable with dilute solutions of acetic acid.  
Conclusions are given as to the chemical processes involved in spontaneous  
heating and a definite correlation is established between the percentage of  
iron extractable from a peat with 6% acetic acid and its liability to  
spontaneous heating. (L).

A. U. See Res Inst Peat Industry

①

MALYSHEV, K. I.      Cand. Tech. Sci.

Dissertation: "Thermal Decomposition of Peat in Conditions of Wet Charring." Moscow  
Peat Inst, 27 May 47.

SO: Vechernyaya Moskva, May, 1947 (Project #17336)

MALYSHEV, K.I., inzh.

Preparing for earthwork operations under winter conditions. Transp.  
stoi. 11 no.10:16-18 0 '61. (MIRA 14:10)  
(Earthwork--Cold weather conditions)

GULIN, E.P.; MALYSHEV, K.I.

Experimental study of the spatial correlation of amplitude and space fluctuations of sound signals reflected from the rippled sea surface. Akust.zhur. 10 no.4:425-430 '64.

1. Akusticheskiy institut AN SSSR, Moskva.

(MIRA 18:2)

Statistical properties of...

5/046/62/000/003/005/007  
B109/B104

ASSOCIATION: Akusticheskiy institut AS USSR Moskva (Acoustics Institute  
AS USSR, Moscow)

SUBMITTED: June 14, 1961

Card 2/2

SECRET  
S/046/62/008/003/003/007  
B108/B104

6.8000

AUTHORS: Gulin, E. P., Malyshov, K. I.

TITLE: Statistical properties of sound signals reflected from agitated sea surface

PERIODICAL: Akusticheskiy zhurnal, v. 8, no. 3, 1962, 292 - 300

TEXT: The fluctuations of underwater acoustic signals reflected from the surface of agitated sea were studied experimentally. Signals of various frequencies (4 - 36 kcps) were received at various distances  $r$  from the source. Both source and receiver were at a depth of 80 m ( $h_1 = h_2$ ). The amplitude variation of the direct signal was 3 - 10% at frequencies of 4 - 15 kcps. Experiments were made under various conditions of surface agitation (surge, ripples, etc.). The determinant factors for the signal fluctuations are the frequency  $f$ , the angle of incidence

$\psi = \arctan \frac{h_1 + h_2}{r}$ , and the root mean square deviation  $\sqrt{F^2}$  of the surface on agitation. The amplitude variation of the reflected signal is greater than that of the direct signal. There are 11 figures.

Card 1/2

USSR / Diseases of Farm Animals. Diseases Caused  
by Helminths.

R-2

Abs Jour: Ref Zhur-Biol., No 2, 1958, 7361

Author : A. N. Mironov, K. G. Malyshev, V. I. Krovyakov  
Inst : Not Given  
Title : Susceptibility of Fur Bearing Animals to Trich-  
inosis.

Orig Pub: Karakulevodstvo i zverovodstvo, 1956, No 6, 48.

Abstract: It is shown that silver-black foxes and polar  
foxes become infected with trichinosis when fed  
with contaminated meat. In this connection  
recommendations are given for the prophylaxis of  
trichinosis.

Card 1/1

MALYSHEV, K. G.

MALYSHEV, K. G.: - "Hygienic principles of animal husbandry". Moscow, 1971. Chair of Zoohygiene with Veterinary Principles, Affiliate of the Russian Veterinary Academy, Min Higher Education USSR. (Dissertation for the degree of Doctor of Veterinary Sciences)

SO: Anizhnaya Letopis', No. 40, 1 Oct 75

*Malyshev, K.G.*  
MALYSHEV, K.G., dots., kand. vet. nauk.

Experiments with Chenopodium oil in Uncinaria and Toxocara infections  
of adult silver foxes. Trudy VIGIS 5:163-164 '53. (MIRA 11:1)  
(Chenopodium oil) (Parasites--Silver fox) (Nematoda)

MALYSHEV, K. G., and RADKEVICH, N. A.

Opyty primeneniya geksilre,ortsina i karbokholina, kak. antgel'minticheskikh sredstv u serebristo-chernykh lisits i golubykh pestsov, "Works on Helminthology" on the 75th Birthday of K. I. Skryabin, Izdat, Akad. Nauk, SSSR, 1953, page 582  
Chair Pharmacology and Chair of Zoohygiene with Veterinary Base at Mosco Fur-Bearing and Fur Institute.

MAIVCHEN, K. G.

19/9. Opyt vy'znanii. Voprosy i'zvestii. O'byedineniye  
toksikologii vzroslykh zhivotnykh i'zvestii. Narodnaya vo'd  
zverovodstvo, No. 1.

AKHMEDOV, A.M., prof., doktor veter. nauk; GONCHAROV, G.D., doktor  
 biol. nauk; DURASOV, V.I.; ZAGAYEVSKIY, I.S., prof., doktor  
 veter. nauk; KUKHARKOVA, L.L.; BAIKASH, A.I., kand. tekhn.  
 nauk; POZHARISKAYA, L.S., kand. tekhn. nauk; LAPTEV, F.P.;  
 LIBERMAN, S.M., kand. tekhn. nauk; PETROVSKIY, V.P., inzh.;  
 MIRONOV, A.N., prof., doktor veter. nauk; MALYSHEV, K.B.,  
 kand. veter. nauk; NIKITIN, B.P., inzh.; POLYAKOV, A.A.,  
 prof., doktor veter. nauk; RUSAKOV, V.N.; TARSHIS, M.G., kand.  
 veter. nauk; SHUR, I.V., prof., doktor veter. nauk; YARNYKH,  
 A.M., red.

[Manual on veterinary and sanitary expertise and hygiene in  
 the processing of animal products] Rukovodstvo po veterinarno-  
 sanitarnoi ekspertize i gigiene pererabotki zhivotnykh pro-  
 duktov. Izd.2., ispr. i dop. Moskva, Kolos, 1965. 426 p.  
 (MIRA 18:6)

ACC NR: AT6036275

containing 0.95% and 2.06% titanium increased its hardness to 280 and 400 HV, respectively. An alloy with 2.5% titanium had a tensile strength of 150 kg/mm<sup>2</sup>, yield strength of 105 kg/mm<sup>2</sup>, an elongation of 10%, and a reduction of area of 18%, compared to 70 kg/mm<sup>2</sup>, 58 kg/mm<sup>2</sup>, 5% and 8% for the conventionally annealed alloys.

SUB CODE: 13/ SUBM DATE: 27May65/ ORIG REF: 012/ OTH REF: 002/ ATD PRESS: 5106

Card 2/2

ACC NR: AT6036275

SOURCE CODE: UR/0000/66/000/000/0026/0038

AUTHOR: Gorbach, V. G.; Malyshch, K. A.; Borodina, N. A.

ORG: Institute of Physics of Metals, AN UkrSSR (Institut metallofiziki AN UkrSSR);  
Institute of Physics of Metals, AN SSSR (Institut fiziki metallov AN SSSR)

TITLE: Using phase transformation and age hardening for induced strengthening of  
austenitic alloys

SOURCE: AN UkrSSR. Struktura metallicheskih splavov (Structure of metal alloys).  
Kiev, Izd-vo Naukova dumka, 1966, 26-28

TOPIC TAGS: austenite transformation, iron nickel alloy, titanium containing alloy,  
metal aging, metal property/ N27T alloy, N27T2 alloy, N27T3 alloy

ABSTRACT: The feasibility of strengthening austenitic iron-nickel-titanium alloys containing 27—29% nickel and 1.0—2.5% titanium by combining the effects of phase transformation and aging has been investigated. Phase transformation of alloys was achieved by refrigeration at -196C and reheating up to 800C, followed by cooling. This treatment produced  $\gamma \rightarrow \alpha \rightarrow \gamma$  transformation, and increased the hardness of austenite to 225—265 HV, compared to 110—120 HV for the alloy after conventional treatment (annealing at 1100C followed by refrigeration). The hardness increased with increasing titanium content. Additional aging at 600C for four hr of the alloy

Card 1/2

ACC NR: AR6027503

and  $\sigma_s$  of samples deformed at 20°C was found beginning at 400-450°C; at these same temperatures the lowering of electrical resistivity was initiated. Magnetic susceptibility increased after 500°C, while  $\psi$  and  $a_k$  decreased. It was concluded that the changes in mechanical properties were caused by processes associated with the formation of  $\alpha$ -phase during cold deformation. During tempering of the deformed samples, the  $\alpha$ -phase of the original deformation is dissolved and some quantities of the ferromagnetic phase appear in separate portions owing to carbide formation. I. Tulupova.

SUB CODE: 11,13

Card 2/2

ACC NR: AR6027503

SOURCE CODE: UR/0137/66/000/004/I019/I019

AUTHOR: Belenkova, M. M.; Mikheyev, M. N.; Malyshev, K. A.; Sadovskiy, V. D.;  
Ustyugov, P. A.

TITLE: Phase transformations during the deformation and tempering of austenitic steel

SOURCE: Ref. zh. Metallurgiya, Abs. 41127

REF SOURCE: [Tr.] In-ta fiz. metallov. AN SSSR, vyp. 24, 1965, 54-58

TOPIC TAGS: metal deformation, austenite steel, martensitic transformation, grain size, magnetic susceptibility

TRANSLATION: A study was made of the magnetic, electrical and mechanical properties of 60Kh318N8V austenitic band steel subjected to deformations of 10, 25, 31, and 43% after quenching from 1050°C. For the same deformation conditions, a fuller decomposition of austenite occurred in large-grained samples as a result of the variation of the position of the martensitic point for a change of grain size (the point of the initial martensitic transformation of large-grained samples was located higher than fine-grained). Under the effect of deformation in the steel, a much greater amount of  $\alpha'$ -phase formed than during tempering. A definite correlation was found between the nature of the magnetic and electrical property changes on the one hand and the mechanical properties on the other, as a function of tempering temperature. Thus, a drop in  $\sigma_b$

UDC: 669.15'26'74'24.781.017.3:621.785.78

Card 1/2

L 14997-66

ACC NR: AP5028564

block dimensions and the specific dilatation for the direct martensitic transformation did not change with increase in Ti content. The reverse transformation--back to austenite--was done by immersing the specimens in hot oil baths and heating at rates of 80-100 deg/sec. In this case, the block dimensions (substructure) of the austenite was again similar for alloys with or without Ti. However, significant differences in the yield strength of the austenite, formed by reverse transformation of martensite, were induced by changes in the rate of heating or the temperature of heating. It was demonstrated that the large rise in strengthening in alloys with Ti could be attributed to aging effects. It was postulated that the higher strength of H27Ti (resulting from phase hardening by slow heating) was due to combined aging and phase hardening. Wedge shaped specimens were heated electrically after being quenched into liquid nitrogen in order to produce temperature gradients across the specimens. The change in hardness was given as a function of distance along the specimens or equivalently for changing aging conditions. Hardness increased with aging, indicating the presence of some form of dispersion precipitate resulting from the Ti addition. Thus maximum hardening could be achieved in Fe-Ni-Ti alloys as a result of combined aging and phase hardening if the heating rate is slow or if the heating temperature is high enough. Orig. art. has: 6 figures, 5 tables.

SUB CODE: 11/

SUEM DATE: 07Dec64/

ORIG REF: 007/

OTH REF: 001

Card 3/3 *PC*

L 14997-66

ACC NR: AP5028564

TABLE 1

Alloys	Chemical composition, %						$M_s$
	C	Si	Mn	Ni	Cr	Ti	
H28	0,04	0,38	0,33	28,3	0,17	—	-20°
H27T	0,04	0,52	0,44	27,0	0,11	1,0	-30°
H27T1	0,04	0,50	0,40	27,0	0,11	1,36	-50°
H27T2	0,04	1,04	0,56	26,9	0,11	2,06	-70°

The ingots were homogenized at 1150°C for 18 hrs, drawn into rounds, sectioned into samples and annealed at 1100°C for 2 hrs (vacuum). The austenitic samples were subsequently cooled from room temperature to -196°C to induce the  $\gamma$ - $\alpha$  transformation. The resulting substructure was analyzed by x-ray methods: harmonic analysis was used to measure the block size and the microdistortion and the data were recorded in terms of specific dilatation,  $\Delta\theta/\tan\theta$ . For each of the alloys the mechanical properties are given in relation to the block size. The characteristic

L 14997-66 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b) IJP(c) MJW/JD/HW  
 ACC NR: AP5028564 (N) SOURCE CODE: UR/0126/65/020/005/0741/0748

AUTHOR: Gorbach, V. G.; Izmaylov, Ye. A.; Malyshev, K. A.

ORG: Institute of Physics of Metals AN SSSR (Institut fiziki metallov AN SSSR);  
 Kirgiz gosuniversitet (Kirgizskiy gosuniversitet)

TITLE: Strengthening of the aging Fe-Ni-Ti alloys during direct and reverse  
 $\gamma$ - $\alpha$ - $\gamma$  transformations

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 5, 1965, 741-748

TOPIC TAGS: martensite steel, martensitic transformation, metal aging, hardening

ABSTRACT: The mechanism of phase hardening (direct and reverse martensitic transformation) was studied in very low carbon Fe-Ni-Ti alloys. The established mechanism, involving the formation of fine substructure in the phase hardened austenite, proved inadequate in explaining the large increases in strength which were commonly observed. The compositions and  $M_s$  temperatures of the alloys used are shown in Table 1.

UDC: 669.15'24'295-157.96 : 539.4.016.3

Card 1/3

I 8857-66 EWT(m)/EWA(d)/T/ENP(t)/ENP(z)/ENP(b)/EWA(h)/EWA(c) JD  
 ACC NR: AP5026744 SOURCE CODE: UR/0286/65/000/017/0020/0020

INVENTOR: Malyshev, K. A.; Borodina, N. A.; Gorbach, V. G. 44.55

ORG: none 77.55

TITLE: Method of heat treatment of austenitic alloys. Class 18, No. 174203 [An-  
 nounced by the Ural Branch of the Institute of Metal Physics, AN SSSR (Ural'skiy  
 filial instituta fiziki metallov AN SSSR)] 44.55

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 17, 1965, 20

TOPIC TAGS: *austenitic steel, metalizing, alloy, metal heat treatment, solid mechanical property*

ABSTRACT: This Author Certificate introduces a method of heat treatment of austenitic alloys which combines direct gamma to alpha and reverse alpha to gamma transformations and produces strain-hardened austenite. Improved mechanical properties are obtained by subsequent aging of strain-hardened austenite while preserving the austenitic structure of the alloys. [AZ]

SUB CODE: 13, 11 / SUBM DATE: 01Feb64/ ATD PRESS: 4152

BVK  
 Card 1/1

UDC: 621.785.797

L 10260-66  
ACC NR: AP5026369

700C, which increased the yield strength to 41 and 37 kg/mm<sup>2</sup>, respectively. Annealing at 800C lowered the yield strength to 13 kg/mm<sup>2</sup> and increased the elongation to 40--46%. In stress-rupture tests at 400C, alloy 1 annealed at 700C had a rupture life of 837 or 55 hr under a stress of 36 or 38 kg/mm<sup>2</sup>, respectively, while conventionally treated (annealed at 1200C) alloy under a stress of 30 or 32 kg/mm<sup>2</sup> had a rupture life of 68.5 or 1.2 hr, respectively. At 600C the positive effect of strain hardening is maintained for a relatively short period of time, not exceeding 100 hr. The effect of transformation-induced strain hardening on alloy 2 was considerably greater. Alloy 2 annealed (after quenching) at 900C had a 100-hr rupture strength at 700C of 17.5 kg/mm<sup>2</sup>, compared to 3.5 kg/mm<sup>2</sup> for alloy 1. Orig. art. has: 4 figures and 2 tables.

SUB CODE: 11/ SUBM DATE: 06May65/ ORIG REF: 016/ OTH REF: 002/ ATD PRESS: 4160

Card 2/2

hw

L 10260-66 EWT(m)/EWP(w)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) IJP(c) JD/HW

ACC NR: AP5026369

SOURCE CODE: UR/0370/65/000/005/0187/0192

AUTHOR: Gaydukov, M. G. (Sverdlovsk); Malyshev, K. A. (Sverdlovsk); Pavlov, V. A. (Sverdlovsk) 62  
B

ORG: none

TITLE: Effect of phase transformation-induced strain hardening on the heat resistance of iron-nickel alloy 18

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 187-192 27 27

TOPIC TAGS: iron alloy, heat resistant alloy, nickel containing alloy, titanium containing alloy, strain hardening, iron base alloy, rupture strength, heat resistance, solid mechanical property 18 27

ABSTRACT: Two iron-base alloys containing 1) 0.06% C and 28.9% Ni, and 2) 0.04% C, 1.73% Cr, 24.5% Ni, and 2.32% Ti were tested for the effect of transformation-induced strain hardening on mechanical properties at room and elevated temperatures. Alloy specimens were austenitized at 1200C and quenched in liquid nitrogen and then annealed at 600, 700, and 800C (alloy 1) are at 900 and 1100C (alloy 2). In alloy 1 the maximum effect was produced by annealing at 600 or

UDC: 6 69.15:24-177

Card 1/2

L 20231-65  
ACCESSION NR: AP5001249

was observed at 700—750C, which coincides with the temperature of reversed martensitic transformation. In this case, the aging process proceeded so rapidly that it was not possible to separate the strengthening produced by transformation-induced strain hardening from that caused by aging. However, by raising the temperature of aging over that at which the  $\text{Ni}_3\text{Ti}$ -phase begins to precipitate it was possible to eliminate the aging. This method showed that the high strength of austenite (tensile strength of 110—125 kg/mm<sup>2</sup>; yield strength of 85—92 kg/mm<sup>2</sup>) is effected by the combined action of phase transformation-induced strain hardening and aging; 30—40% strengthening can be attributed to strain hardening and 60—70% to aging. Orig. art. has figures.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Physics of Metals, AN SSSR)

SUBMITTED: 15Apr64

ENCL: 00

SUB CODE: MM

REF SOV: 005

OTHER: 003

ATD PRESS: 3163

Card 2/2

L 20231-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(b) Pad IJP(c)  
 ACCESSION NR: AP5001249 JD/HW 8/0126/64/018/005/0793/0796

AUTHOR: Malyshev, K. A.; Vasillevskaya, M. M.

TITLE: Effect of  $\gamma$ -state aging on the phase-transformation-induced  
hardening of Fe-Ni-Ti alloy

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 5, 1964,  
 793-795

TOPIC TAGS: iron alloy, mineral containing alloy, titanium contain-  
 ing alloy, alloy aging, alloy strain hardening, phase transformation  
 induced hardening

ABSTRACT: A series of experiments was conducted with iron-base alloys  
 containing 0.05% C, 27% Ni, and 1-3.5% Ti in an attempt to separate  
 the strengthening effect of aging from that of phase transformation-  
 induced hardening. The direct martensitic transformation in these  
 alloys begins at -50 to -80C and reverse transformation at 700-750C.  
 It was found that the effect of aging depends upon the temperature and  
 the titanium content: the higher the titanium content and the aging  
 temperature, the higher is the aging rate. The highest rate of aging

Card 1/2

7047-65  
ACCESSION NR: AP044152

2

austenitic Fe-Ni-Ti alloys with the transformation-induced strain hardening compared with the strengthening of identical alloys without Ti. After cooling to the liquid nitrogen temperature, the N27, N27T, N27T2, and N26T3 alloys contained 20, 30, 35, and 60% residual austenite, respectively. Analysis of the experimental data showed that in Fe-Ni-Ti alloys cooled in liquid nitrogen and then tempered at temperatures lower than the reverse martensitic transformation range, several diffusional processes took place. The processes comprise formation of the nickel-enriched  $\gamma$ -phase, aging with the precipitation of an intermetallic  $\text{Ni}_3\text{Ti}$  phase and, possibly, ordering in the  $\alpha$ - and  $\gamma$ -solid solutions. Hence, a significant increase in the hardness of these alloys with tempering is the result of complex processes of which the aging is the most important. Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of the Physics of Metals, AN SSSR)

SUBMITTED: 21 Oct 61

ATD PRESS: 3104

ENCL: 00

Card CODE: MM, 12

NO REF SOV: 003

OTHER: 004

2/2

07047-65 EWT(m)/EWP(q)/EWP(b) AS(mp)-2/ASD(m)-3 HAW/JN/HW  
 ACCESSION NR: AP4044152 8/0126/64/018/002/0239/0244

AUTHOR: Malyshov, K. A.; Vasilovskaya, M. M.

TITLE: Changes due to tempering in the physical properties of martensite in iron-nickel alloys with titanium

SOURCE: Fizika metallov i metallovedeniye, v. 18, no. 2, 1964, 239-244

TOPIC TAGS: iron nickel titanium alloy, alloy aging, alloy tempering, martensitic transformation, aged alloy physical property, aged alloy phase composition

ABSTRACT: Fe-Ni-Ti alloys (N27,<sup>1</sup> N27T,<sup>1</sup> N27T2,<sup>1</sup> and N26T3,<sup>1</sup> containing 0.03—0.06% C, 0.35—0.64% Si, 0.43—0.54% Mn, 26.00—27.46% Ni, 0 to 3.58% Ti) were homogenized at 1200C, water quenched from 1150C, cooled in liquid nitrogen to obtain martensite, tempered in a salt bath at a temperature of 100—750C for a period of time varying from 5 min to 12 hr, and then air cooled. After each heat-treatment operation, hardness HV, electric resistivity R, coercive force H<sub>c</sub>, and magnetisation I were measured to determine causes of a higher strengthening of

Card 1/2

GORBACH, V.G.; MALYSHEV, K.A.

Precipitation hardening of high-carbon austenitic alloys. Fiz. met. i  
metalloved. 17 no.2:229-233 F '64. (MIRA 17:2)

1. Institut fiziki metallov AN SSSR.

L 39999-65

ACCESSION NR: AT40-9810

working, the strength of cast steel increases 1.5-2 times more than that of forged steel, although the absolute value remains lower by 10-20%. Cast steel after phase working has a coarse grain structure and dendritic heterogeneity. Orig. art. has: 3 figures.

ASSOCIATION: None

SUBMITTED: 21 May 64

ENCL: 00

SUB CODE: MM

NO REF SOV: 002

OTHER: 000

Card 3/3 *pm*

L 39999-65

ACCESSION NR: AT4049810

4

reverse martensitic transformation temperature interval was determined with a D. S. Shteynberg and V. I. Zyuzin magnetometer.<sup>14</sup> Both alloys were cast into 12-kg ingots and were then forged into 12x12 mm bars which were quenched from 1100C in water. The samples were 6 mm in diameter with a working part of 60 mm. The alloy containing Ti could not be tested since it is always magnetic. The samples were cooled to -196C and were then placed in a furnace heated to 720-740C (20-40C above the  $\alpha \rightarrow \gamma$  transformation temperature) for 15-20 minutes, after which they were water quenched. The tests showed that multiple phase working does not improve the mechanical properties in comparison with single phase working. Phase working of cast steel leads to results similar to those obtained with forged alloys. The mechanical properties of a forged alloy are higher than for a cast alloy, while a cast alloy shows a continuous drop in resiliency as the number of phase working cycles increases. Further tests of the alloys showed that higher strength is obtained after phase working when the initial yield point is higher. The authors conclude that a coarse grain structure in cast alloys and dendritic liquation strongly affect the development of direct and reverse martensitic transformation, but do not prevent hardening of cast steel by phase working. As a result of phase

Card 2/3

L 39999-65 EWT(a)/EWT(n)/EWP(w)/EWA(o)/EWP(v)/T/EWP(l)/EWP(k)/EWP(h)/EWP(n)/  
EWP(g)/EWP(l)/EWA(o) PT-4/Pad IJP(c) JD/RW/GS

ACCESSION NR: AT4049110

S/0000/64/000/000/0027/0032

AUTHOR: Gorbach, V. G.; Malyshov, K. A.; Vladimirov, L. R.; Smirnov, L. V.

TITLE: Hardening of cast austenitic steel by the phase working method

SOURCE: Soveshchaniye po uprochneniyu detaley mashin, 1962. Protsey uprochneniya detaley mashin (Processes of the hardening of machine parts); doklady soveshchaniya. Moscow, Izd-vo Nauka, 1964, 27-32

TOPIC TAGS: cast steel, austenitic steel, cast austenitic steel, phase working, steel hardening, steel grain structure, steel mechanical property

ABSTRACT: The term phase working means to alter the mechanical properties of a metal or alloy by direct or reverse phase transformation. This phenomenon appears to the greatest extent when the volume changes during crystal lattice transformation. The aim of the present investigation was to determine the possibility of hardening cast austenitic alloys by phase working and to determine the hardening characteristics peculiar to cast steel. Two alloys were tested: 1) C-0.39%, S-1.54%, Mn-0.61%, Cr-2.04%, Ni-17.75%, and 2) C-0.05%, Si-0.5%, Mn-0.4%, Cr-0.1%, Ni-27.0% and Ti-1.5%. This chemical composition permitted determination of the effect of the cast structure on alloy hardening by phase working. The direct and

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44  
40  
B11

APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031900002-6

GORDACH, V.G.; MALISHEV, K.A.; GESS, A.V.; USTYUGOV, P.A.

Effect of high temperature paening without recrystallization on the  
mechanical properties of dispersion-hardening steels. Metalloved. i  
term. obr. met. no.1:24-27 Ja '64. (MIRA 17:3)

L 39999-65 EMT(a)/EMT(m)/EMP(w)/ENA(d)/EMP(v)/T/EMP(l)/EMP(k)/EMP(h)/EMP(x)/  
APPROVED FOR RELEASE: 06/23/11: CIA-RDP86-00513R001031900002-6

Phase-hardening as a method for ...

S/810/62/000/000/001/013

described, and the role of the amount of M that participates in the PhH is interpreted. Repeated direct-and-reverse cycles (up to 8) did not afford any substantial additional toughening. The effect of alloying elements on the toughening resulting from PhH is discussed. Cr, Mn, Si, and W additions did not produce any change in toughenability from that of the Fe-Ni alloy. Up to 0.4% C improved the hardening effect from 50-65 kg/mm<sup>2</sup>. In summary, the degree of toughening of A alloys depends on the chemical composition, relative amount of M that participates in the direct and reverse MT, and the heating temperature during the reverse MT into A. Maximum toughening resulting from PhH corresponds approximately to the hardening obtained by plastic deformation "up to saturation." The process of PhH is interpreted as being due to a refinement of the block structure of the A. There are 7 figures and 5 references (3 Russian-language Soviet, 2 German).

ASSOCIATION: None given.

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Phase-hardening as a method for ...

S/810/62/000/000/001/013

room temperature to sub-freezing temperatures brings about a MT, and subsequent heating produces the reverse transformation of M into A. In high-alloyed A steels the second transformation may occur at relatively low temperatures, not exceeding 400-600°C. If the solid solution contains alloying-element atoms of low mobility, the  $\alpha \rightarrow \gamma$  transformation can proceed by a nondiffusional ordering mechanism, that is, reverse MT occurs in heating. The end result of the direct-reverse MT is a hardening (toughening) of the A. The transformation is schematically illustrated. The lab investigation comprised: (a) Fe-Ni (30% Ni), (b) A low-C alloys (0.05-0.07% C), and (c) A alloys with 0.4-0.6% C. The alloys were smelted in an HF furnace, cast into 30-kg ingots (homogenized at 1,150-1,200°C for 10-12 hrs), and were forged into rods from which specimens 3 mm diam, 50 mm long, were made for magnetometric (MM) tests, and billets 10x10x60 mm were prepared for mechanical tests. The MM specimens were heated twice in vacuum to 1,100° with an intermediate cooling to -196°C in liquid N. Uniform grain size was obtained in all alloys. Galvanometric determinations were made of the M point, the temperature of the end of the reverse  $\alpha \rightarrow \gamma$  transformation during heating, and the relative amount of M upon cooling to liquid-N temperature ( $\alpha$ , %). The PhH itself was accomplished by liquid-N cooling of the specimens to produce direct  $\gamma \rightarrow \alpha$  MT and then heating them to 20-30° above the temperature of the end of the reverse transformation  $\alpha \rightarrow \gamma$  and final cooling in water. Details of the PhH of Fe-Ni are

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S/810/62/000/000/001/013

AUTHORS: Malyshev, K. A., Borodina, N. A., Gorbach, V. G.

TITLE: Phase-hardening as a method for the toughening of austenitic steels.

SOURCE: Metallovedeniye i termicheskaya obrabotka; materialy konferentsii po metallovedeniyu i termicheskoy obrabotke, sost. v g. Odesse v. 1960 g. Moscow, Metallurgizdat, 1962, 21-28.

TEXT: The paper proposes a new method for increasing the toughness of austenitic (A) steels (S), the so-called "phase hardening" (PhH), for A which upon direct and reverse martensitic transformation (MT) undergoes appreciable toughening. The paper also adduces experimental data. PhH consists in cold treatment at liquid-N temperature and subsequent short-term heating to 600-700°C. The new method overcomes the inadequacies of plastic deformation as a sole means of toughening of austenite which is limited in the type of parts to which it is applicable and which affects the magnetic properties of the metal. The new method also has advantages over strengthening by means of dispersion hardening which is accompanied by a sharp reduction in toughness and ductility. PhH is more accurately defined as a hardening or toughening produced during phase transformation in cooling or in heating. The initial cold treatment of a suitably selected austenitic steel from

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~~MALYSHEV, K. A.~~

Dissertation defended for the degree of Doctor of Technical Sciences at the  
Institute of Metal Physics in 1962:

"Phase and Structural Transformations in the Heating of Steel."

Vest. Akad. Nauk SSSR. No. 4, Moscow, pages 119-145

81908

S/126/60/010/01/013/019  
E111/E335

Influence of Deformation of Martensite on the Cold Shortness of  
Austenitic Steels and Their Hardening in Plastic Deformation

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of  
Physics of Metals of the Ac.Sc., USSR)  
Ural'skiy zavod tyazhelogo mashinostroyeniya im.  
S. Ordzhonikidze (Ural Heavy Engineering Works  
imeni S. Ordzhonikidze)

SUBMITTED: February 23, 1960

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81908

S/126/60/010/01/013/019

E111/E335

Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

tensile strength, yield point, toughness and magnetic susceptibility on deformation temperature is shown in Figs. 9, 10, 11 and 12. 40G18 and 50G18 steels showed pronounced cold shortness, which could be considerably reduced or completely eliminated by additional alloying with chromium or nickel. The reason for the cold shortness is deformation-martensite formation during low-temperature impact testing. The good effect of alloying the manganese steels with chromium and nickel is explained by the increased austenite stability with respect to plastic-deformation induced martensite transformation. Formation of such martensites is the reason for the greater hardening of manganese austenitic steels in cold compared with 200-300 °C plastic deformation. In stable austenitic steels, additionally alloyed with chromium and nickel, hardening in cold and semi-hot work-hardening is practically the same. There are 12 figures, 3 tables and 5 Soviet references.

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81908

S/126/60/010/01/013/019  
E111/E355

Influence of Deformation of Martensite on the Cold Shortness of Austenitic Steels and Their Hardening in Plastic Deformation

0-0.71 W, 0-0.010 S, 0-0.067 P. 60 mm long pieces were cut from 12 x 12 mm forged bars. The pieces were heated to 1150 °C and cooled in water. Magnetometric tests showed no martensite transformation on cooling to -196 °C. Standard notched test-pieces (2 mm deep notch, 1 mm radius of curvature) were used for impact tests from room to liquid-nitrogen temperature. Alpha-phase (deformation martensite) was found with great sensitivity by measuring magnetic susceptibility (Ref 3) of austenite on 3 x 4 x 9 mm pieces cut from the fracture region of impact specimens, Mohr's salt being used as the standard. In a second series of experiments the austenitic steels after quenching from 1150 °C were rolled at 20-600 °C to give 30% deformation. Figs. 1-3 show the toughness of the various steels as functions of test temperature, the effect of the various alloying elements being brought out; magnetic susceptibility as functions of test temperature being similarly shown in Figs. 4 and 5. Figs. 6 and 7 show deformation of martensite structures and Fig. 8 the fractures obtained at various temperatures. The dependence of

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MALYSHEV, K.A.

81908

187500

S/126/60/010/01/013/019  
E111/E335AUTHORS: Belenkova, M.M., Kodlubik, I.I., Malyshev, K.A.,  
Mikheyev, M.N., Sadovskiy, V.D. and Ustyugov, P.A.TITLE: Influence of Deformation of Martensite on the Cold  
Shortness of Austenitic Steels and Their Hardening  
in Plastic Deformation.PERIODICAL: Fizika metallov i metallovedeniye, 1960. Vol. 10,  
No. 1, pp. 122 - 130

TEXT: Investigation of a series of austenitic steels<sup>1</sup> has shown that some have a tendency to brittle fracture. The authors point out that martensite formation during cold-shortness testing is the probable cause and that liability of austenitic steels to form martensite in plastic deformation depends on the position of the deformation temperature relative to the martensite point (Ref 2) and the temperature at which austenite and martensite free energies are equal. Their present work dealt with the following steels (analysis in Table 1): 40G18, 40G18Kh4, 40G18Kh8, 40G18Kh4N4, 40G18Kh4N8, 40G18Kh4N8V, 50G18, 50G18Kh4, 50G18Kh4N8V, 50G18Kh4N4, covering the composition ranges (%): 0.40 - 0.55 C, 0.071 Si, 17.30-18.60 Mn, 0.8-0.9 Cr, 0.8-3.2 Ni, ✓

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SOV/126-7-2-30/39  
On the Influence of the Speed of Heating on the Recrystallization  
Texture of Transformer Steel

are in agreement with the results given in this paper.  
There is one German reference.

(Note: This is a complete translation)

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of  
Metal Physics, Ac.Sc., USSR)

SUBMITTED: March 22, 1958

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SOV/126-7-2-30 '39

On the Influence of the Speed of Heating on the Recrystallization  
Texture of Transformer Steel

growth of grains which are orientated in a certain way. 3. What was said in paragraph 1 relates to melts which, under industrial conditions, yield a perfect structure and favourable magnetic properties. In specimens obtained from heats which yield poor magnetic properties, a relatively low degree of perfection of the texture is obtained for all heating regimes which, in the best case, does not exceed 50%; the type of texture of the specimens from heats of this group is also characterized by the fact that the predominant orientation of the grains is  $\{110\} \langle 001 \rangle$ . As regards the processes of texture formation, slow heating of specimens obtained from such heats provides only insignificant advantages as compared to rapid heating. The problem of the influence of the speed of heating on the formation of recrystallization textures of cold-rolled materials has so far not been elucidated in literature. Assmus et al. (Ref 1) published certain data on the kinetics of the process of texture formation at various temperatures. Indirectly the results of these authors

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SOV/126-7-2-30/39

On the Influence of the Speed of Heating on the Recrystallization  
Texture of Transformer Steel

basis of the obtained results the following conclusions  
were arrived at:

1. With increasing heating speed a continuous decrease occurs in the degree of perfection of the texture obtained at the respective temperatures. Holding at the respective heating temperature brings about a slight improvement of the degree of perfection of the texture. On heating with a speed of the order of  $1^{\circ}\text{C}/\text{min}$ , the degree of perfection of the texture reaches 95%, whilst on heating at a speed of 300 to  $1000^{\circ}\text{C}/\text{sec}$  it does not exceed 25-30%. The heating speed does not influence the type of texture: at all heating regimes the texture is characterized by the predominance of the orientation  $\{110\}$  and  $\langle 001 \rangle$ .
2. On heating at a speed of  $300-1000^{\circ}\text{C}/\text{sec}$  up to temperatures of  $1000-1300^{\circ}\text{C}$ , the grains grow to dimensions which are commensurate with the thickness of the sheet, consequently an increased heating speed does not suppress the grain growth generally but only the preferential

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SOV/126-7-2-30/39

On the Influence of the Speed of Heating on the Recrystallization  
Texture of Transformer Steel

and short time durations, ensuring thereby all the properties specified by the GOST specifications. For cold-rolled transformer steel, the authors studied additionally the influence of the speed of heating on the degree of perfection of the texture and it is to this problem that the present paper is devoted. The investigations were carried out on industrially produced 0.5 and 0.35 mm thick strip with a Si content of 3.0 to 3.2%, produced by cold-rolling twice with an intermediate anneal at 800 to 850°C, whereby the relative reduction during each pass amounted to 50-60%. For the investigations the specimens were taken from melts intended for finished products with greatly differing properties. Heating of the specimens to 1000-1300°C was effected in ordinary furnace and in a salt bath with various heating durations between 1 sec and 15 mins and also by direct passage of electric currents through the specimen. In all cases the specimens were cooled in air after heating. The heating speed varied between 1°C/min and 1000°C/sec. On the

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18(3), 18(7), 24(2)

SOV/126-7-2-30/39

AUTHORS: Grigorov, K.V., Malyshev, K.A., Mironov, L.V.,  
Rodigin, N.M. and Eazonov, B.G.

TITLE: On the Influence of the Speed of Heating on the  
Recrystallization Texture of Transformer Steel  
(O vliyanii skorosti nagreva na teksturu rekristallizatsii transformatornoy stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 2,  
pp 305-306 (USSR)

ABSTRACT: In conjunction with the development of a method of heat treatment of moving steel strip by induction heating, the authors of this paper investigated the kinetics of the processes taking place during rapid heating of cold-rolled strip of various grades: carbon, dynamo, transformer and stainless steels. It was established that re-crystallization and grain growth proceed at a very high speed. Thus, for instance, it is possible to effect recrystallization in less than 0.12 sec, including the heating time. This permits electric annealing of cold-rolled strip of the above mentioned grades, with the exception of transformer steel, at very high speeds

Card 1/5

Influence of the Temperature of Plastic Deformation on the Structure  
and Impact Strength of Austenitic Steel

SOV/126-7-1-14/28

ASSOCIATION: Institut fiziki metallov AN SSSR (Institute of Metal  
Physics, Ac.Sc. USSR); Ural'skiy zavod tyazhelogo  
mashinostroyeniya imeni S. Ordzhonikidze (Ural Establish-  
ment of Heavy Machine-building imeni S. Ordzhonikidze).

SUBMITTED: November 19, 1957

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SOV/126-7-1-14/28

Influence of the Temperature of Plastic Deformation on the Structure and Impact Strength of Austenitic Steel

at high temperatures. Hence it can be assumed that raising the temperature exercises a stronger influence on the change of the mechanism of plastic deformation than change in deformation speed. The mechanical properties of austenite deformed at various temperatures without relaxation and recrystallisation can be related to the structure and mechanism of mechanical deformation. Deformation of austenite at 400-450°C gives a more favourable combination between impact strength and hardness than cold deformation. The experiment has shown that working of austenite in the temperature range 900-1100°C leads to a distinct decrease in brittleness of the austenitic steel which is normally caused by lengthy ageing. This decrease in brittleness may be associated with the mechanism of plastic deformation (block formation) and the jagged shape of the boundaries of deformed grains which lengthens the intergranular boundaries and renders intergranular fracture more difficult.

There are 9 figures and 8 references, of which 3 are English and 5 Soviet.

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SOV/126-7-1-14/28

Influence of the Temperature of Plastic Deformation on the Structure  
and Impact Strength of Austenitic Steel

specimens are shown in Fig.9. The change in structure of austenite with rise in deformation temperature is on the whole analogous to results obtained for polycrystalline pure aluminium (Refs.1-5), and permits a conclusion about the mechanism of plastic deformation to be drawn. At low temperatures deformation occurs by slip. As the temperature rises this is replaced by block formation. The absence of slip lines within the grains of austenite deformed at high temperatures, and the fact that recrystallisation develops along the grain boundaries, is a proof that deformation becomes increasingly localised in the grain boundaries as the temperature rises. The present investigation has been carried out under conditions of great deformation speed and large reductions, i.e. under conditions approaching those of hot rolling. The results obtained lead to the conclusion that the mechanism of block formation and diffusion plasticity observed at high temperatures is not an exceptional characteristic of metal creep under load, but is the basis for the actual process of mechanical deformation of metals

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SOV/126-7-1-14/28

Influence of the Temperature of Plastic Deformation on the Structure and Impact Strength of Austenitic Steel

test in this case was carried out at room temperature. Fig. 1 shows the influence of the temperature of deformation on the structure of austenite; (a) deformation at 20°C; (6) at 150°C; (8) at 300°C; (1) at 500°C. In Fig. 2 the influence of deformation temperature on the structure of austenite is again shown: (a) deformation at 700°C; (6) at 850°C; (8) at 1050°C; (1) at 1200°C. Fig. 3 shows the appearance of grain boundaries after high temperature deformation. Fig. 4 shows the structure of the specimen deformed at room temperature after partial recrystallisation. Fig. 5 shows the structure of a specimen deformed at 450°C after partial recrystallisation. Fig. 6 shows the structure of a specimen deformed at 850°C after partial recrystallisation. In Figs. 7 and 8 the results of hardness and impact strength tests of austenitic steel specimens deformed by 30% by rolling at temperatures of 20, 400, 500, 900, 1000 and 1100°C, and water cooled, are shown. The deformed specimens were tested at liquid nitrogen temperature (Fig. 7) and at room temperature (Fig. 8). The results of impact strength and hardness determinations of deformed and un-deformed

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SOV/126-7-1-14/28

Influence of the Temperature of Plastic Deformation on the Structure  
and Impact Strength of Austenitic Steel

Prior to deformation, all specimens were heated to 1150° and held there for 20 minutes. Deformation at temperatures below 500°C was carried out on specimens which had been quenched from 1150°C. For deformation at higher temperatures specimens, which had been heated to 1150°C, were cooled to the required temperatures. In order to avoid recrystallization the specimens were cooled in water immediately after deformation. In order to bring out slip lines the deformed specimens, prior to being made into micro-sections, were aged at 700°C for two hours. A notch, 2mm deep, was made in the deformed specimens for impact testing. As the toughness of austenitic steel, cooled in water after deformation, is very great, impact tests were carried out at liquid nitrogen temperatures. Under certain conditions the investigated austenitic steel suffers very intense ageing which greatly lowers its impact strength. The influence of the preliminary plastic deformation of austenite on the impact resistance of the steel under conditions of prolonged ageing was studied by testing the impact resistance of deformed specimens which had been aged for a long time. The impact

Card 2/6

AUTHORS: ~~Malyshev, K.A.~~, Bogacheva, G.N., Sadovskiy, V.D. and  
Ustyugov, P.A. SOV/126-7-1-14/28

TITLE: Influence of the Temperature of Plastic Deformation on the  
Structure and Impact Strength of Austenitic Steel  
(Vliyanie temperatury plasticheskoy deformatsii na  
strukturu i udarnuyu vyazkost' austenitnoy stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1959, Vol 7, Nr 1,  
pp 102-109 (USSR)

ABSTRACT: In this paper the structure of austenitic steel, deformed  
by rolling at various temperatures, was investigated, and  
it was endeavoured to establish a relationship between the  
change in structure and mechanical properties in the  
ductile and brittle states (the last after ageing).  
Experiments were carried out with the austenitic steel  
60Kh4G8N8V. Specimens of this steel, 11 x 11 x 60 mm,  
were deformed in laboratory hand-rollers at various  
temperatures between room temperature and 1200°C (at  
50° intervals). Reduction in area in all cases was  
Card 1/6 about 30%. Rolling speed was 13 mm/sec in all cases.

SOV/137-59-4-8513

## Strengthening of Metastable Austenite Alloys by Means of Phase Hard-Facing

$\gamma \rightleftharpoons \alpha$  and  $\alpha \rightarrow \gamma$  transformation. The number of cycles varied between 1 to 8. As a result of a single transformation cycle of  $\gamma \rightarrow \alpha + \gamma$ , considerable increase of  $\sigma_s$  was observed;  $\sigma_b$  increased less whereas  $\sigma_k$  decreased. An increased number of cycles leads to additional but small increase of  $\sigma_s$ . The degree of strengthening of the  $\gamma$ -phase is determined by the initial state of  $T_m$  and by the amount of martensite participating in reverse martensite transformation  $\alpha \rightarrow \gamma$ . Austenite strengthening due to phase hard-facing is connected with the refinement of the domain structure. Stabilization of the  $\gamma$ -phase, strengthened as a result of direct and reverse martensite transformation, is observed in Fe-Cr-Ni and in Fe-Mn-Cr-Ni alloys and does not take place in Fe-Ni alloys; this is explained by the different magnitude of stresses of second kind. The authors investigated the effect of higher C content in austenitic alloys on the magnitude of strengthening in phase hard-facing. The investigated alloys contain C (0.05%); chrome alloys contain also N. Redistribution of C and N in the  $\gamma$ -phase lattice during the heat process in reverse martensite transformation has a substantial effect on stabilization or destabilization of the  $\gamma$ -phase, as a result of direct and reverse martensite transformation. There are 9 bibliographical titles.

Card 2/2

V.G.

✓

Translation from: Referativnyy zhurnal, Metallurgiya, 1959, Nr 4, p 168 (USSR)  
 SOV/137-59-4-8513

AUTHORS: Malyshev, K.A., Borodina, N.A., Mirmel'shteyn, V.A.

TITLE: Strengthening of Metastable Austenitic Alloys by Means of Phase Hard-  
 Facing

PERIODICAL: Tr. in-ta fiz. metallov. Ural'skiy fil. AS USSR, 1958, Nr 20,  
 pp 339 - 348

ABSTRACT: The authors investigated strengthening of austenitic alloys by means of phase hard-facing, developing as a result of direct and reverse martensite transformation  $\gamma \rightleftharpoons \alpha$ . The following alloys were investigated: Fe-Ni (27.8% Ni); Fe-Cr-Ni (C 0.05%, Mn 0.33%, Cr 9.7%, Ni 13.73%) and Fe-Mn-Cr-Ni (C 0.05%, Cr 5.1%, Mn 2.87 - 6.8%, Ni 9.72 - 14.69%). The following method of heat treatment for phase hard-facing was mainly used (one cycle): cooling below the martensite point  $T_m$  for the purpose of martensite formation; heating over  $T'_\alpha$ , i.e. the final temperature of reverse martensite transformation  $\alpha \rightleftharpoons \gamma$ , for the purpose of austenite formation, and cooling-off to room temperature. Phase hard-facing, consequently, was developing by means of double

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SOV/126-6-5-31/43  
Influence of Carbon on the Stabilisation of Austenite in Fe-Cr-  
Alloys

Acknowledgments are made to V.D. Sadovskiy for his advice.  
There are 3 figures and 3 references, 1 of which is  
Soviet, 1 English and 1 French.

ASSOCIATION: Institut fiziki metallov Ural'skogo filiala AN SSSR  
(Institute of Metal Physics, Ural Branch of AS USSR)

SUBMITTED: June 10, 1957

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SOV/126-6-5-31/43

# Influence of Carbon on the Stabilisation of Austenite in Fe-Cr-Ni Alloys

of austenite as a result of direct and reverse martensite transformation (phase hardening), was also observed (Ref 1). However, stabilisation by phase work hardening, shown in Figure 2, is temporary and is due to a high  $M_s$  temperature of the decarburised alloy. On holding the stabilised specimens at room temperature, a strong isothermal transformation occurs, as a result of which the quantity of martensite increases and gradually approaches that of martensite obtained by isothermal soaking of an unstabilised specimen cooled from 1 100 °C (see Figure 3). The following conclusions are arrived at:

- 1) For the stabilisation of austenite by isothermal soaking above the  $M_s$  point the presence of carbon (nitrogen) in the alloy is essential.
- 2) For the stabilisation of austenite as a result of direct and reverse martensite transformation, the presence of carbon (nitrogen) is not essential.

Card3/4

SOV/126-6-5-31/43

# Influence of Carbon on the Stabilisation of Austenite in Fe-Cr-Ni Alloys

re-heating to 1 100 °C, the  $M_s$  point of the decarburised alloy was found to be 180 to 190 °C. In order to investigate the stabilisation of austenite in the decarburised alloy at temperatures above the  $M_s$  point, the specimens were cooled in liquid nitrogen, then heated to 1 100 °C, held there for 20 min and transferred to a salt bath at 400, 500 and 600 °C, respectively, where they were held for various lengths of time from 1 to 24 hours. Subsequently, they were cooled to room temperature in a magnetometer. In Figure 1 martensite transformation curves are shown which were obtained for a specimen after soaking at 500 °C, side-by-side with the martensite curve of a specimen which had not been given isothermal treatment. Similar results were obtained after isothermal soaking at 400 and 600 °C. The martensite curves of specimens which were isothermally treated and those which were not, fully coincide, which points to the absence of any stabilisation as the result of soaking the gamma-phase at temperatures of 400, 500 and 600 °C. In the same alloy containing 0.05% C, stabilisation

Card2/4

SOV/126-6-5-31/43

AUTHORS: Borodina, N.A., Malyshev, K.A. and Mirmel'shteyn, V.A.

TITLE: Influence of Carbon on the Stabilisation of Austenite in Fe-Cr-Ni Alloys (Vliyaniye ugleroda na stabilizatsiyu austenita v Fe-Cr-Ni splavakh)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 5, pp 937 - 938 (USSR)

ABSTRACT: In earlier work (Ref 1) strong stabilisation of austenite in an alloy containing 0.05% C, 9.70% Cr and 13.73% Ni having an  $M_s$  point of -10 to 20 °C, was found to be brought about by isothermal soaking at 300, 400 and 500 °C. As the isothermal treatments were not accompanied by visible separation of the carbide phase, the suggestion was made that stabilisation and de-stabilisation are associated with internal re-arrangement of carbon in the austenite lattice (Ref 2). In order to check the influence of carbon on stabilisation, magnetometric specimens of 3 mm diameter, made of the same alloy, were exposed to a lengthy decarburisation treatment at 1 100 °C in hydrogen, followed by vacuum treatment ( $10^{-4}$  mm Hg col). After cooling the specimens in liquid nitrogen and

Card1/4

MALYshev KA.

PHASE I BOOK EXPLOITATION SOV/3847  
SOV/26-M-20

Academiya nauk SSSR. Ural'skiy filial. Institut fiziki metallov  
Trudy, vyp. 20 (Transactions of the Institute of the Physics of  
Metals, Ural Branch, Academy of Sciences USSR, No. 20) Sverd-  
lovsk, 1958. 402 p. Errata slip inserted. 1,000 copies  
printed.

Resp. Eds.: S.V. Yonovskiy, Corresponding Member, Academy of  
Sciences USSR, and V.I. Arkharov, Doctor of Technical Sciences.  
PURPOSE: This book is intended for scientists working in the field  
of physical metallurgy.

COVERAGE: This is a collection of 28 articles written by members of the  
Institute of the Physics of Metals, Ural Branch of the Academy of Sciences  
USSR, on problems investigated at the Institute. Studies at the  
Institute are concentrated on two basic problems: 1) developing  
a theory of metals and alloys and finding ways to improve the  
properties of engineering materials; and 2) developing new phys-  
ical methods for investigating and controlling the quality of  
materials and metals. The articles in the collection treat the following sub-  
jects: problems of the multielectron quantum-mechanical theory  
of solids; the laws of distribution and diffusion of solutes in  
various metallic alloys (internal adsorption of solutes); strength  
and plasticity of polycrystalline material; crystallization; struc-  
tural binding forces; distortions in the crystal lattice; struc-  
ture theory of diffused phases; theory of the magnetic structure  
of ferromagnetic substances; theory of the heat treatment of  
steel; and the physical theory of magnetic measurements (magnetic  
flaw detection and structural analysis). The first article is a  
description of the work being done by the Institute in the field  
of departments and laboratories along with the scientific personnel.  
Several persons are cited for their work at the Institute. Refer-  
ences accompany each article.

Rodionov, K.P. Effect of High Pressure on Some Physical Properties of  
Solids 273  
Bunov, M.N. Investigation of Decomposition in Supersaturated  
Metallic Solid Solutions 283  
Sadovskiy, V.D. Structural Mechanism of Phase Over-Crystalliza-  
tion During the Heating of Steel 303  
Gorbach, V.O. and V.D. Sadovskiy. Effect of Preliminary Heat  
Treatment of Steel on the Transformation Kinetics of Supercooled  
Austenite 311  
Komaritsky, N.A. and V.D. Sadovskiy. Correcting the Structure  
and Fracture of Cast Alloyed Steel Through Heat Treatment 329  
Malyshev, K.A., N.A. Borodina, Y.A. Mironov, and V.D. Sadovskiy. Strengthening  
of Ferrite-Austenite Alloys by Means of Phase Hardening 339  
Rodigin, N.M. High-Speed Heating for Investigating Electrothermal  
Treatment and Other Purposes 349  
Bibliography of Works by Members of the Institute of the Physics  
of Metals, Ural Branch of the Academy of Sciences USSR for the  
Years 1932-1956 357  
AVAILABLE: Library of Congress (TN607.A\*)  
Card 6/6

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8-2-60

See

SOV/124-58-11-13627

The Influence of High-temperature Plastic Deformation (cont.)

along the boundaries during the tempering and contribute to the development of the brittleness.

D. M. Vasil'yev

Card 2/2

SOV/124-58-11-13627

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 11, p 233 (USSR)

AUTHORS: Sadoyskiy, V. D., Malyshev, K. A., Sokolov, Ye. N., Smirnov, L. V., Bogacheva, G. N., Biryulin, V. T., Petrova, S. N.

TITLE: The Influence of High-temperature Plastic Deformation on the Temper and Aging Brittleness of Quenched Steels (Vliyaniye plasticheskoy deformatsii pri vysokikh temperaturakh na khrupkost' pri otpuske i starenii zakalennykh staley)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2. Moscow, AN SSSR, 1957, pp 76-91

ABSTRACT: As a result of tests it was found that the brittleness developed upon aging of austenite steel of the 60Kh4G8N8V type, as well as upon aging of industrial high-temperature steel, can be held down through the application of a combined thermomechanical treatment consisting of the quench-hardening of a plastically deformed nonrecrystallized austenite. The authors explain the effect of the thermomechanical treatment by the sharp localization of the deformation, which at elevated temperatures proceeds along the grain boundary, which leads to a reduction in the unfavorable effect of the phases that separate out

Card 1/2

## Fractures in Structural Steel

SOV/137-57-10-20216

overheated in hardening). It also holds for steels quenched to martensite or to martensite or to intermediate austenite decomposition products. F does not expose the GB in cases of viscous failure (fibrous fracture), in a steel containing pearlite, if the crack passes along the grains or the GB of the pearlitic component, in cases of precipitation of nonmetallic inclusions along the GB during prior operations (casting, rolling, or forging) or if there is a crystallographically ordered structure due to prior high heating. An examination is made of types of F arising in structural steel under various conditions of heat treatment. Ways and means of eliminating naphthalin F (transcrystalline F through the austenite grain) are examined. An examination is made of types of lithoidal cleavage fracture (completely or partially intercrystalline F along the GB of austenite, existing at the moment of overheating) and of methods of eliminating them. Technical recommendations are made on evaluating structure in accordance with the appearance of the F and methods of correcting it.

L.M.

Card 2/2

SOV/137-57-10-20216

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 10, p 258 (USSR)

AUTHORS: Sadovskiy, V.D., Malyshev, K.A.

TITLE: Fractures in Structural Steel (Izlomy konstruktsionnoy stali)

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AN SSSR, 1956, Nr 17,  
pp 111-118

ABSTRACT: An examination is made of the possibilities and limitations of the method of studying the structure of steel by the appearance of fractures (F). It is shown that while the standard metallographic analysis does not detect differences in structure due to temper brittleness, the appearance of a F changes sharply when this phenomenon is present from the normal fibrous to intergranular. The change in the appearance of the F is related to the fact that indistinguishable structural changes induce sharp shifts in the cold-shortness threshold. A brittle intergranular F reveals the grain size of austenite prior to the cooling of the steel. This proposition holds for cases in which the F crack proceeds along the grain boundaries (GB) of the (initial) austenite, where there are heterophasic impurities that weaken the GB concentrate (and, sometimes, microscopic cracks, such as in steel

Card 1/2

137-58-2-4068

## The Effect of the Intragranular Texture and Recrystallization of Austenite (cont.)

double normalization as overheated steel, but its cold-brittleness threshold was lower. The fracture and the structure of steel 40Kh were found to be similar to those of steel 50. The intragranular texture of steel 40Kh proved more stable than that of steel 50; it was eliminated completely only after steel 40Kh had been rapidly heated to 850 and 900° for double normalization, which lowered the cold-brittleness threshold to -80°. In the specimens of steel 40Kh not subjected to overheating the cold-brittleness threshold was below -80° regardless of the type of heat treatment used. As the temperature of the test was reduced, high-temperature-tempered steel 40Kh (regardless of the type of heat treatment) exhibited a gradual decline in the  $a_k$  value, with no apparent cold-brittleness threshold. The fracture became completely brittle only at -196°. It was found that the  $a_k$  level and the cold-brittleness-threshold temperature of steels 50 and 40Kh depended on the size of the actual austenite grain. In a single heat treatment the effect of overheating was not fully eliminated, and the intragranular texture remained.

V. A.

## 1. Steel—Mechanical properties—Austenitic factors

Card 2/2

137-58-2-4068

MALYSHEV, K.A.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 257 (USSR)

AUTHORS: Malyshev, K.A., Biryulin, V.T.

TITLE: The Effect of the Intragranular Texture and Recrystallization of Austenite on the Mechanical Properties of Alloy Steels (Vliyaniye vnutrizerennoy tekstury i rekristallizatsii austenita na mekhanicheskiye svoystva legirovannykh staley)

PERIODICAL: Tr. In-ta fiz. metallov. Ural'skiy fil. AN SSSR, 1956, Nr 17, pp 72-93

ABSTRACT: An investigation was made of the influence of the intragranular texture and recrystallization of austenite on the  $a_k$  value of steels 50 and 40Kh at low temperatures. Overheated, normalized, and high-temperature-tempered specimens were impact-tested at temperatures of 20, 0°, -20, -40, -60, -80, -100, and -196°C. It was found that overheated steel 50 even at room temperature exhibited an intragranular texture and brittleness ( $a_k < 1 \text{ kgm/cm}^2$ ). Subsequent heat treatment eliminated partially or fully (in the case of double normalization) the intragranular texture and lowered the cold-brittleness threshold.

Card 1/2 Steel not subjected to overheating had the same  $a_k$  level after

4E2C

SOBOUSKIN, V.D.; MALYSHEV, K.A.; SAZANOV, B.G.

of recrystallization is related to the existence of a new crit. point, that of anisotropic recrystallization, caused by internal stresses, more accurately of a certain temp. interval located in the austenitic field of constitutional diagrams, and, therefore, unconnected with allotropic changes. This point, which corresponds to a full recrystallization of steel, appears to be identical with the point of Cottrell proposed before the establishment of the  $A_1$  and  $A_2$  crit. temps. (cf. *Science of Metals*, Metallurgy, 1953).

J. D. Gal

3/3

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 SADOVSKIY, V.D.; MALYSHEV, K.A.; SAZONOV, B.G. 4E28

cryst. at the same time. With a moderate cooling rate each austenite grain is broken into a no. of primary areas, the individuality of grains of the original structure is lost to a great extent, and the fracture appearance is dead, by the size of pearlitic colonies. On cooling, an acicular structure of the decomposition products results and the situation is basically changed. Crystallographically oriented transformation mechanism induces an intercryst. texture linking acicularites of the original grain into a single pseudo-cryst. complex, a pseudograin, which inherits the size, shape, and, to some extent, the orientation of the primary grain. Coarse fracture of cast steel depends on the creation and retention above the crit. point of the secondary intra-granular structure, i.e., crystallographic orientation of the primary austenitic grains permitting in spite of allotropic transformations above the  $A_1$ - $A_2$  points. "Isellulination" is connected with the recryst. of the already formed austenite well above the  $A_1$ - $A_2$  points, i.e., around 1000-1100°, caused by internal stresses in the new austenitic grains produced by volumetric changes of the  $\alpha$ - $\gamma$  transformation. Their formation depends, with the same composition, also original structure, on the rate of heating. Samples of C 0.5, Cr 1.5, Si 1.5% steel oil quenched from 1800° released to 920° and either furnace cooled or oil quenched showed a coarsely cryst. fracture when the heating rate to 920° was 200°/sec. or 5-8°/min. and very fine fracture when the heating rate of 150-200°/min. was employed, fracturing being done at ~100°. The new scheme

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Methods for inducing the growth of spherulites from a  
liquid crystalline phase. J. Polym. Sci. Part A: Polym. Chem.,  
Vol. 10, No. 1, 1972, pp. 1-10. Cooling  
large spherulitic grains of some hypocoalene may lead  
to the growth of spherulites at the boundaries and within  
the grain, the orientation of which follows that of the orig-  
inal spherulitic grain. Spherulites, as a rule, are formed as in-  
dividual spherulites, the orientation of which is independent  
from that of the original spherulitic grain. With an increas-  
ing undercooling, the no. of spherulitic colonies inside of each  
primary crystal increases, and their orienting power with  
respect to the original grain and among themselves de-  
creases. When it is sufficient to suppress spherulitic growth,  
the spherulites disappear, with the formation of a pseudocrystal-  
line spherulitic matrix of lamellar character. The no. and  
size of these colonies in each primary grain, as well as their  
orientation, are defined by undercooling. At this point the  
structure loses completely its original character, and fur-  
ther reheating above the  $A_c$  point for quenching or normaliz-  
ing cannot induce grain coarsening, as shown by fracture.  
With a still higher cooling rate or an increased alloy content  
the spherulitic transformation is suppressed and is replaced  
with the martensitic formation which is randomly oriented with  
respect to spherulites leading to coarse fractures. While  
each unit corresponding to an spherulitic grain breaks, in  
this case, into a multitude of  $\alpha$ -phase crystals, the latter  
are united into groups, characterized by a common orienta-  
tion, which can be called intergranular texture and which  
persists in transformations. The product of such trans-  
formation in each primary grain is polycrystalline and mono-

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Solid Bodies

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 3621

hardening and to the direct (cooling in liquid nitrogen) and reverse (heating to 750°) martensitic transformation. In this case the stabilization is accompanied by a substantial austenite strengthening, which can be used for practical purposes. Thus, the same phenomenon of austenite stabilization may be caused by two factors, which at first glance appear to be contradictory, one (the isothermal soaking above the martensitic point) leading to a reduction in the lattice distortion of the austenite and the second (phase hardening) leading to their increase.

Card : 2/2

MALYSHEV, K. A.

Category : USSR/Solid State Physics - Phase Transformation in Solid Bodies E-5

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6621

Author : Malyshev, K.A., Borodina, N.A., Kirmel'shteyn, V.A.  
Inst : Institute of Physics of Metals, Ural' Branch, Academy of Sciences, USSR

Title : Stabilization of Austenite at Temperatures Above the Martensitic Transformation Range

Orig Pub : Fiz. metallov i metallovedeniye, 1956, 2, No 2, 277-284

Abstract : Magnetometric investigations with two low-carbon (0.05%) Cr-Ni-Mn steels, having martensitic points at -10 and 800, have established that stabilization and destabilization of austenite take place as a result of isothermal soaking of specimens in the austenitic state at 300, 400, 500, 600° for one to 260 hours. Increasing the temperature and increasing the duration of the soaking in the above ranges superimposes a destabilization process on the stabilization process, and as a result the final effect is determined by the ratio of these two processes. The stabilization of austenite is also due to phase

Card : 1/2

⑤

1. 1947-1948 1949-1950 1951-1952 1953-1954 1955-1956 1957-1958 1959-1960 1961-1962 1963-1964 1965-1966 1967-1968 1969-1970 1971-1972 1973-1974 1975-1976 1977-1978 1979-1980 1981-1982 1983-1984 1985-1986 1987-1988 1989-1990 1991-1992 1993-1994 1995-1996 1997-1998 1999-2000 2001-2002 2003-2004 2005-2006 2007-2008 2009-2010 2011-2012 2013-2014 2015-2016 2017-2018 2019-2020 2021-2022 2023-2024 2025-2026 2027-2028 2029-2030 2031-2032 2033-2034 2035-2036 2037-2038 2039-2040 2041-2042 2043-2044 2045-2046 2047-2048 2049-2050 2051-2052 2053-2054 2055-2056 2057-2058 2059-2060 2061-2062 2063-2064 2065-2066 2067-2068 2069-2070 2071-2072 2073-2074 2075-2076 2077-2078 2079-2080 2081-2082 2083-2084 2085-2086 2087-2088 2089-2090 2091-2092 2093-2094 2095-2096 2097-2098 2099-2100 2101-2102 2103-2104 2105-2106 2107-2108 2109-2110 2111-2112 2113-2114 2115-2116 2117-2118 2119-2120 2121-2122 2123-2124 2125-2126 2127-2128 2129-2130 2131-2132 2133-2134 2135-2136 2137-2138 2139-2140 2141-2142 2143-2144 2145-2146 2147-2148 2149-2150 2151-2152 2153-2154 2155-2156 2157-2158 2159-2160 2161-2162 2163-2164 2165-2166 2167-2168 2169-2170 2171-2172 2173-2174 2175-2176 2177-2178 2179-2180 2181-2182 2183-2184 2185-2186 2187-2188 2189-2190 2191-2192 2193-2194 2195-2196 2197-2198 2199-2200 2201-2202 2203-2204 2205-2206 2207-2208 2209-2210 2211-2212 2213-2214 2215-2216 2217-2218 2219-2220 2221-2222 2223-2224 2225-2226 2227-2228 2229-2230 2231-2232 2233-2234 2235-2236 2237-2238 2239-2240 2241-2242 2243-2244 2245-2246 2247-2248 2249-2250 2251-2252 2253-2254 2255-2256 2257-2258 2259-2260 2261-2262 2263-2264 2265-2266 2267-2268 2269-2270 2271-2272 2273-2274 2275-2276 2277-2278 2279-2280 2281-2282 2283-2284 2285-2286 2287-2288 2289-2290 2291-2292 2293-2294 2295-2296 2297-2298 2299-2300 2301-2302 2303-2304 2305-2306 2307-2308 2309-2310 2311-2312 2313-2314 2315-2316 2317-2318 2319-2320 2321-2322 2323-2324 2325-2326 2327-2328 2329-2330 2331-2332 2333-2334 2335-2336 2337-2338 2339-2340 2341-2342 2343-2344 2345-2346 2347-2348 2349-2350 2351-2352 2353-2354 2355-2356 2357-2358 2359-2360 2361-2362 2363-2364 2365-2366 2367-2368 2369-2370 2371-2372 2373-2374 2375-2376 2377-2378 2379-2380 2381-2382 2383-2384 2385-2386 2387-2388 2389-2390 2391-2392 2393-2394 2395-2396 2397-2398 2399-2400 2401-2402 2403-2404 2405-2406 2407-2408 2409-2410 2411-2412 2413-2414 2415-2416 2417-2418 2419-2420 2421-2422 2423-2424 2425-2426 2427-2428 2429-2430 2431-2432 2433-2434 2435-2436 2437-2438 2439-2440 2441-2442 2443-2444 2445-2446 2447-2448 2449-2450 2451-2452 2453-2454 2455-2456 2457-2458 2459-2460 2461-2462 2463-2464 2465-2466 2467-2468 2469-2470 2471-2472 2473-2474 2475-2476 2477-2478 2479-2480 2481-2482 2483-2484 2485-2486 2487-2488 2489-2490 2491-2492

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"On Methods of Pulverizing the Grain of Cast Alloy Steel by Heat Treatment."  
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Malyshev, K.A.

✓ Nature of naphthalene-like break in high-speed steel.  
 H. V. D. Sadovskii, K. A. Malyshev, and N. V. Vyal. *Trudy Inst. Fiz. Metal., Akad. Nauk S.S.R., Ural, Fiz. No. 14, 88-92 (1954); cf. C.A. 48, 8162c.* High-speed steels quenched from 1280 to 80° develop a large grain size and a fracture having a flaky appearance like naphthalene if rehardened. On rehardening, vol. changes during the  $\alpha$ - $\gamma$  transformation cause deformation of the new austenite grains and promote their recrystn. Large grains develop as a result of "collective" recrystn. which is assocd. with the high recrystn. temp. of high-speed steel (250-300° above the  $\alpha$ - $\gamma$  transformation) and the kinetics of pptn. and soln. of carbides. Development of large grains can be avoided by rapid heating during the rehardening operation.

H. W. Rathmann

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*MALYSHEV, K.A.*

SADOVSKIY, V.D.; MALYSHEV, K.A.; SAZONOV, B.G.; SHEVYAKINA, L.Ye., redaktor;  
LUCHKO, Yu.V., redaktor; KOVALENKO, N.I., tekhnicheskij redaktor.

[Phase and structure changes during the heating of steel] Fazovye i  
strukturnye prevrashcheniya pri nagreve stali. Sverdlovsk, Gos. nauch-  
no-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1954. 183 p.  
(Metallography) (Steel--Heat treatment) (MLRA 8:1)

MALYSHEV, K.A.

Chemical Abst.  
Vol. 48 No. 3  
Feb. 10, 1954  
Metallurgy and Metallography

④  
Chernov's *b* point. —Y. D. Sadovskii, K. A. Malyshev, and H. G. Sazonov. *Izv. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1953, 68-81. —Historical discussion of the work on metallography of iron by Chernov (*Zhur. Russ. Met. Obshchestva* 1916, No. 3-4; originally reported in 1868) and an explanation of his definitions of *a* and *b* points in the Fe phase diagram. 20 references.

G. M. Kosolapoff

SADOVSKIY, V.D.; MALYSHEV, K.A.; SAZONOV, B.G.

Structural mechanism of phase transformation in rapid heating of  
steel. [Izdatiia] LONITOMASH no. 30:55-69 '52. (MLRA 8:1)  
(Steel--Heat treatment)

CA

Recrystallization of austenite dependent on internal cold work. K. A. Malyshev, V. D. Sadoyskil, and B. G. Stronov (Ural Branch Acad. Sci. U.S.S.R.), *Doklady Akad. Nauk S.S.S.R.* 76, 61-4 (1951). Steel KhG (C 1.11, Mn 0.02, Cr 1.29, Si 0.22%) was oil quenched from 1200° and cooled in liquid N<sub>2</sub> and was then reheated at 100° sec. to 800° or to 975° and water quenched. The R<sub>c</sub> hardness for 800° was 87 and for 975° was 49. The fracture grain size for 800° was coarse, like in the original steel, but for 975° it was fine. Breaks in the oscillograph records of the heatings indicated that the  $\alpha \rightarrow \gamma$  transformation occurred at 745°. Orientation relations thus exist for phase transformations on heating as well as on cooling. Internal cold working of the transformed austenite grains caused them to recrystallize and to undergo later grain growth. Micrographic evidence for this view was obtained. A. G. Guy.

Inst. 7 Metals, Ural Offic, AS USSR

Translation B-80363, 16 Nov 54

MALYSHEV, K. A.

③

Nature of naphthalene-like break in high-speed steel.  
 V. D. Sadovskii, K. A. Malyshev, and N. V. Val. *Izvest. Sektsiya Pis.-Khim. Anal., Akad. Nauk S.S.S.R.* 20, 345-50 (1950).—High-speed steel ordinarily contg. W, Cr, and V is usually hardened from 1260 to 1280°. Such steel has a fine-grained structure and a porcelain-like break. If this steel is rehardened from the same temp. there is a sudden growth of crystals, the structure becomes coarse-grained, and the break has the appearance of naphthalene (flaky). The cause of it was studied by hardening samples from 1280°, followed by annealing at 550-800° for 1-8 hrs., and rehardening part of the specimens. The growth of the grain-size and the naphthalene-like break upon rehardening is not caused by residual austenite. The coarse-grained structure is attributed to the fact that the alloying elements from solid solns. at the temp. of the 1st hardening. During the 2nd hardening they have no time to sep. out from the martensite as carbides, and the transformation of the  $\alpha$ -soln. into  $\gamma$  comes about without diffusion and the original size of the austenite grains is retained. The further growth of the austenite grains is the result of recrystn. connected with intensive soln. of the carbides as the temp. rises. This recrystn. is referred to as "collective" recrystn.

M. Hosh

MALYSHEV, K. A.

Chemical Abst.  
Vol. 48 No. 8  
Apr. 25, 1954  
Metallurgy and Metallography

✓ Heredity of an austenite grain. K. A. Malyshev. Trudy  
Inst. Fiz. Metal., Ural. Filial, Akad. Nauk S.S.S.R. No. 12,  
142-9(1949). — 15 references. A. G. Guy

MAIYONOV, K.A.

21753

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Kinetics and mechanism of grain growth in austenite  
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*MALYSHEV, K.A.*

The Initial Temperature in the Growth of the Austenite Grain in Relation to the  
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**Effect of electric heating for hardening on the structure and mechanical properties of steels 48Kh and 41KhN3M.**  
K. A. Malyshev and V. A. Pavlov. *Trudy Inst. Fe-Metal*,  
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The advantages are discussed of elec. heating for hardening. The primary purpose is the possibility of preserving a small grain austenite structure. M. Hoch.

Phase transitions in electrically heated steel. K. A. Malyshev and V. A. Pavlov. *Trudy Inst. Fiz. Metal.*, Acad. Nauk S.S.S.R., *Tral. Filial* No. 9, 11-10 (1946). Heating steel at a rate of 200-400° sec. by passing a current through it did not affect the  $A_{c1}$  point materially. The rate of pearlite transformation on electric heating is very rapid and

is dictated by the rate of heating. At a heating rate of 200-400° sec. the transformation was accomplished within fractions of a sec. Sorbitic and small lamellar pearlite changed to austenite faster than granular pearlite. At a very rapid rate of heating but insufficiently high temps. a no. of structures appeared in the hardened steel, the hardness was high but the structure was not homogeneous. M. Hosh

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[Heat treatment of steel] Osnovy termicheskoi obrabotki stali.  
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